

HOW TO DETECT ROOT-KNOT NEMATODE WHEN MAKING ANNUAL NURSERY INSPECTIONS.

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An annual inspection must be made each year at each registered nursery in Florida. The major objectives of this annual inspection are 1) to detect exotic plant pests that have been inadvertently introduced into Florida; 2) to detect plant pest infestations of native plant pests at epidemic levels or unusually high numbers that cast doubt on the wisdom of selling the infested plants (such a condition indicates poor pest control management on the part of the nursery); and 3) to evaluate sanitation practices in nurseries with an approved sanitation program.

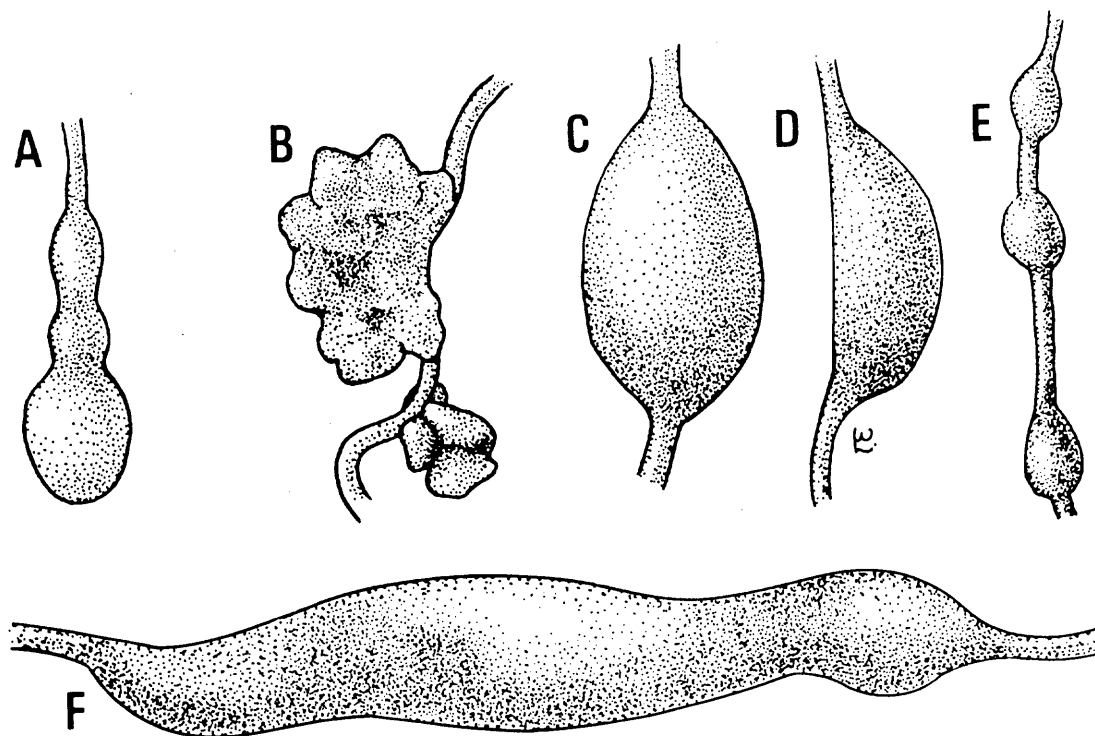


Fig. 1. Root gall types that can be caused by root-knot nematodes. A. Terminal, B. Irregular, C. Large oval, D. Lateral, E. Minute, F. Longitudinal.

Other objectives include noxious weed assessment such as dodder or volunteer torpedo grass recently seen in large nursery stock containers or plants in such poor condition, due to dehydration, being rootbound or cold damaged, that they are unsaleable.

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Root-knot nematode detection (*Meloidogyne* spp.)

Target host selection is the first step in detecting root-knot nematode infestations. Table 1 has a list of 166 target root-knot nematode hosts. This list is based on the examination of 10,700 root-knot nematode records dating from 1936. Only records listing root-knot nematodes in excess of 71 specimens per sample were used. Many of the records represent several hundred root-knot nematode larvae. The number following the plant name (occurrence) should be considered in the selection of target hosts. The higher the occurrence number, the more likely it will be infested with root-knot nematodes.

Procedure

Select plants in the nursery found in the top 20 of Table 1. If none of the plants in the top twenty list are present in the nursery, check host 21-166 for possible targets.

In the walk through inspection, look for groups of target plants that are stunted, declining, chlorotic, with sparse foliage, or a combination of the aforementioned symptoms. When such groups of plants are found, the roots should be examined for root galls (Fig. 1). Remove two or more plants from the container (less than 10") [25 cm] by upending the container and striking it with the heel of one's hand. Many roots will be visible for root gall inspection. If plants are in flats, pull several plants out of the flat, shake off soil, and examine for root malformations. In large containers (greater than 12") [30 cm] use the D.P.I. sampling tool and submit the samples to the Bureau of Nematology. If galls (Fig. 1), swellings, protuberances, fasciations (abnormally flattened roots) or any other root abnormalities are present, take soil and root samples and submit them to the Nematology Bureau for analysis.

If large groups of severely galled, unthrifty plants are encountered, they should be declared unsaleable and quarantined following confirmation of the pest. Terminal galls (Fig. 1-A) are most serious since such galls inhibit root tip growth. The presence of root galls or other root abnormalities found in young seedlings, or rooted seedlings found in thumb pots or flats present a very serious pest infestation. Very young plants with evident root galling may not survive to maturity, and if they do survive will produce unhealthy, low grade mature plants.

Since presently there are few effective nematicidal treatments available that will completely eliminate populations of root-knot nematodes, nurserymen should be encouraged to destroy all root-knot nematode infested plants. Quarantined or unquarantined plants infected with root-knot nematode, allowed to remain in the nursery for extended periods of time, will pose the risk of contaminating healthy nursery stock, thereby compounding the problem of nematode infestations in the nursery.

Table 1. Principal target hosts of root-knot nematodes in Florida ornamental nurseries.

A. <u>Top Ten</u>	Plant/occurrence	<u>Top Ten</u>	Plant/occurrence
1. Arecastrum romanzoffianum (queen palm)/137		6. Hemerocallis spp. (daylilies)/161	
2. Buxus spp. (boxwood)/99		7. Hibiscus sp./82	
3. Caladium sp./267		8. Monstera deliciosa/77	
4. Ficus spp. (fig)/230		9. Philodendron cordatum/115	
5. Gardenia sp./105		10. Philodendron sp./159	
B. <u>11 - 20</u>	Plant/occurrence	<u>11 - 20</u>	Plant/occurrence
11. Ardesia crenata/41		16. Gardenia jasminoides/39	
12. Brassia actinophylla/57		17. Maranta leuconeura 'Erythroneura' (prayer plant)/49	
13. Caladium bicolor/56		18. Maranta sp./46	
14. Dieffenbachia spp./47		19. Philodendron selloum/54	
15. Dracaena spp./39		20. Syngonium spp./39	
C. <u>Others</u>	Plant/occurrence	<u>Others</u>	Plant/occurrence
21. Abelia triflora/4		76. Crinum sp. (crinum lily)/1	
22. Acalypha sp./4		77. Cryptanthus sp. (earthstar)/1	
23. Acoelorrhaphe wrightii/1		78. Cyclamen sp. (Persian violet)/3	
24. Acorus gramineus 'Pusillus'/3		79. Dianthus caryophyllus (carnation)/3	
25. Aeschynanthus radicans/1		80. Dizygotheca elegantissima/9	
26. Agapanthus africanus/1		81. Dracaena arborea/1	
27. Agave sp./8		82. Dracaena marginata/36	
28. Aglaonema sp./11		83. Dracaena reflexa/2	
29. Ajuga reptans (bugle-weed)/10		84. Epiphyllum sp./1	
30. Alocasia sp. (elephant's-ear)/38		85. Epipremnum aureum (pothos)/11	
31. Aloe vera/6		86. Epipremnum sp./12	
32. Aloe sp./29		87. Eschscholzia californica/1	
33. Alpinia sp./1		88. Euphorbia spp./16	
34. Alternanthera amoena/1		89. Euphorbia pulcherrima/4	
35. Anthurium sp./14		90. Ficus benjamina/9	
36. Antirrhinum majus (snapdragon)/8		91. Fittonia sp./3	
37. Anubias barteri/1		92. Fuchsia sp./1	
38. Anubias nana/1		93. Gardenia jasminoides/7	
39. Asparagus virgatus/1		94. Gerbera sp./4	
40. Asplenium nidus (bird's-nest-fern)/1		95. Gerbera jamesonii/12	
41. Astrophytum myriostigma (Bishop's cap)/1		96. Gladiolus sp./37	
42. Beaucarnea recurvata/7		97. Gypsophila paniculata (baby's-breath)/2	
43. Begonia X semperflorens-cultorum/3		98. Hedychium sp. (ginger lily)/9	
44. Begonia spp./37		99. Heliconia sp./13	
45. Billbergia spp./3		100. Hemigraphis alternata/4	
46. Buxus microphylla/13		101. Hemigraphis spp./10	
47. Caladium X hortulanum/9		102. Hibiscus rosa-sinensis/26	
48. Caladium sp./17		103. Hippeastrum sp. (amaryllis)/21	
49. Calathea sp./20		104. Hoya spp. (wax plant)/28	
50. Calendula officinalis/2		105. Hygrophila stricta/1	
51. Calliandra haematocephala (powder puff)/5		106. Hymenocallis sp. (sea daffodil, spider lily)/1	
52. Callistemon spp. (bottlebrush tree)/36			
53. Callistemon viminalis (bottlebrush)/4			
54. Camellia spp./36		107. Ilex crenata/6	
55. Canna edulis/4		108. Ilex spp./30	
56. Canna generalis/1		109. Illicium spp. (anise)/33	
57. Canna sp./5		110. Iris sp./2	
58. Caryota sp. (fishtail palm)/1		111. Ixora coccinea/3	
59. Cereus sp./1		112. Ixora spp./15	
60. Chamaedorea cataractarum/1		113. Jasminum spp./3	
61. Chamaedorea elegans/18		114. Jatropha spp./3	
62. Chamaedorea erumpens/17		115. Juniperus spp./18	
63. Chamaedorea seifrizii/5		116. Kalanchoe spp./22	
64. Chamaedorea sp./20		117. Lagerstroemia indica/17	
65. Chlorophytum comosum (spider plant)/6		118. Lantana sp./9	
66. Chlorophytum spp. (spider plant)/2		119. Leea coccinea (West Indian holly)/2	
67. Chrysalidocarpus lutescens/34		120. Licuala grandis/2	
68. Chrysalidocarpus spp./10		121. Lilium spp./17	
69. Chrysanthemum spp./24		122. Liriope muscari (lily turf)/7	
70. X Citrofortunella mitis (calamondin)/1		123. Liriope sp./17	
71. Codiaeum spp. (croton)/8		124. Malva sp./1	
72. Coleus blumei (painted nettle)/1		125. Nemophila sp./1	
73. Coleus spp./15		126. Nephrolepis exaltata (fern)/16	
74. Colocasia sp. (elephant's-ear)/13		127. Nephthytis sp./5	
75. Crassula spp./7		128. Passiflora sp./12	
		129. Pelargonium sp. (geranium)/3	

<u>Others</u>	<u>Plant/occurrence</u>	<u>Others</u>	<u>Plant/occurrence</u>
130.	<i>Peperomia bicolor</i> /3	148.	<i>Schefflera arboricola</i> /27
131.	<i>Petunia</i> sp./5	149.	<i>Schefflera</i> sp./2
132.	<i>Phaius</i> sp./3	150.	<i>Spathiphyllum</i> sp./16
133.	<i>Philodendron scandens</i> subspecies <i>oxycardium</i> /21	151.	<i>Strelitzia nicolai</i> /8
134.	<i>Pilea cadierei</i> /6	152.	<i>Strelitzia reginae</i> /3
135.	<i>Plectranthus australis</i> (Swedish ivy)/2	153.	<i>Strelitzia</i> sp./9
136.	<i>Polianthes tuberosa</i> (tuberose)/28	154.	<i>Tagetes erecta</i> /5
137.	<i>Polyscias</i> spp./10	155.	<i>Tibouchina urvilleana</i> /2
138.	<i>Portulacaria afra</i> (elephant bush)/1	156.	<i>Tradescantia flumensis</i> (wandering jew)/5
139.	<i>Radermachera sinica</i> /4	157.	<i>Viola</i> spp. (violet)/8
140.	<i>Radermachera</i> sp. (China doll)/2	158.	<i>Xanthisma texanum</i> (sleepy daisy)/1
141.	<i>Rhododendron</i> sp. (azalea)/12	159.	<i>Xanthosoma lindenii</i> (spoon flower)/2
142.	<i>Rosa</i> spp./4	160.	<i>Yucca</i> spp./12
143.	<i>Rumohra adiantiformis</i> (fern)/4	161.	<i>Yucca elephantipes</i> /11
144.	<i>Saintpaulia ionantha</i> (violet)/3	162.	<i>Zamia</i> spp./6
145.	<i>Sansevieria</i> sp./9	163.	<i>Zantedeschia</i> sp. (calla lily)/4
146.	<i>Sansevieria trifasciata</i> /3	164.	<i>Zephyranthes</i> sp. (rain lily)/1
147.	<i>Scaevola</i> sp./2	165.	<i>Zygocactus</i> sp. (Christmas cactus)/1

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